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Taxonomic Paper

# New records of Trichoceridae (Diptera) from the island of Mallorca

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## Abstract

### Background

The Trichoceridae are a small family distributed mainly in the Holarctic Region, most of which are associated with cold seasons and even snow. From the Iberian peninsula, 5 species have been recorded; however only a single previous occurence record exists from the Balearic islands.

### New information

In this paper we present new records of two species from Mallorca, of which *Trichocera (Saltrichocera) saltator* (Harris, 1776) has not previously been recorded from the Balearic islands. *Trichocera* (*Saltrichocera*) *annulata* Meigen, 1818 is recorded for the first time from Mallorca. We furthermore discuss the species' distributions within the Mediterranean region and report new morphological data for the Mallorca island form of *T. saltator*.

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## Keywords

Trichoceridae, faunistics, new records, Mallorca, Majorca, Balearic Islands, winter gnats

## Introduction

Winter gnats (Diptera: Trichoceridae) are a small family that includes approximately 160 recent species, 110 of which are classified in the widespread genus *Trichocera* Meigen, 1803. Species of this genus are mainly distributed in the Holarctic region and prefer lower temperatures, so are mostly observed during the colder season and even on snow.

In the catalogue of Diptera of Spain, Portugal and Andorra, Dahl et al. (2002) listed 5 species of Trichoceridae known from Spain with two of those – *Trichocera* (*Saltrichocera*) *annulata* Meigen, 1818 and *Trichocera* (*Saltrichocera*) *maculipennis* Meigen, 1818 – recorded from the Canary islands. There were no records of Trichoceridae from Balearic islands until 2009, when one male of *Trichocera* (*S.*) *annulata* was found on Menorca island (Carles-Tolrá and Ventura 2009).

Here we present further data on winter gnats of Balearic islands, with new records of this family from the island of Mallorca.

## Materials and methods

Specimens were collected by sweeping at various localities in Mallorca during February 2015, and preserved in 70–100% alcohol. Voucher specimens are retained in Museum of Zoology of Vilnius University (MZVU), Vilnius, Lithuania. Localities visited are given in Fig. 1 and the map was produced using the SimpleMappr online tool (Shorthouse 2010). Temperatures given in Table 1 are taken from the closest meterological measuring stations presented by Meteo de Mallorca (2016); and are given as the minimum and the maximum measured temperature on the day of sampling.

Table 1.

Localities of Mallorcan Trichoceridae

| Locality number | North | East | Locality name | Habitat | Sampling date | Temperature range in centigrades | Collectors |
|---|---|---|---|---|---|---|---|
| 1 | 39.670459 | 2.569193 | Esporles, Torrent de Son Vic | vegetation on stream banks | 10.02.2015 | 3–15 | G.Kvifte |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2 | 39.752634 | 2.642415 | Deia, Tributary to Torrent Major | rocky stream bed with bryophytes | 08.02.2015 | 3–10 | G.Kvifte, M. Stokkan & C.Garcia |
| 3 | 39.663051 | 2.573698 | Esporles, Son Tria recreational area | Vegetation near stream bank and fountain | 09.02.2015 | 3–13 | G.Kvifte & C.Garcia |
| 4 | 39.690612 | 2.525107 | Banyalbufera | Seaside cliffs | 09.02.2015 | 3–13 | G.Kvifte |
| 5 | 39.332245 | 3.166440 | Cala Figuera | vegetation in canyon near port | 11.02.2015 | 5–16 | G.Kvifte |
| 6 | 39.330871 | 3.165476 | Cala Figuera | open forest glade in town | 11.02.2015 | 5–16 | G.Kvifte |
| 7 | 39.614133 | 2.553593 | Son Serralta | stream bank near bridge and waterfall | 12.02.2015 | 5–13 | G.Kvifte |

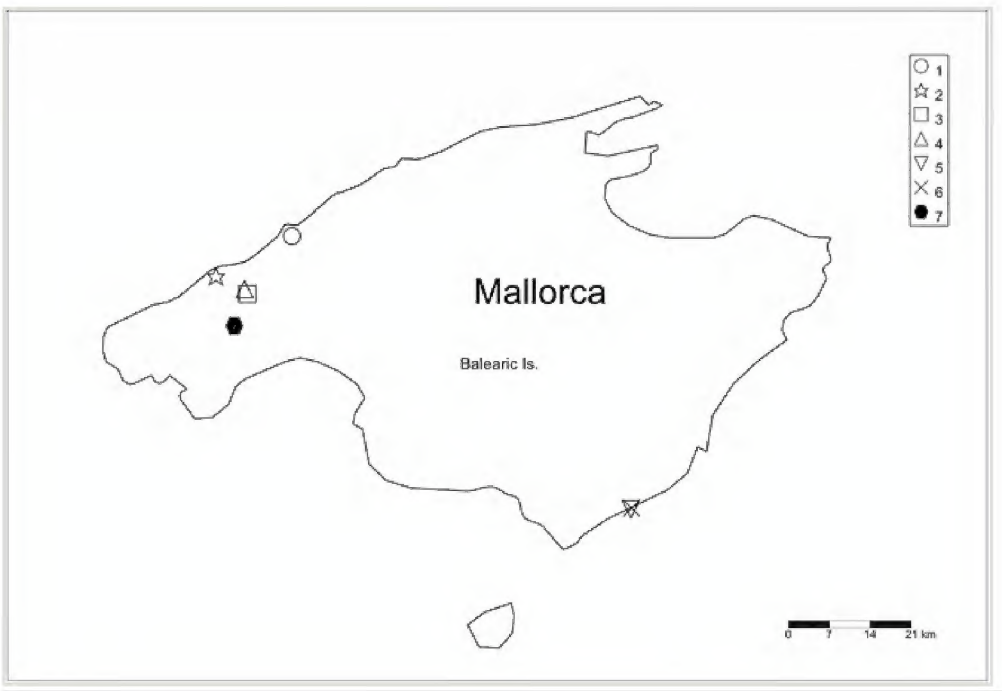


Figure 1.

Map of localities for Mallorcan *Trichocera* (see Table 1 for locality details).

# Taxon treatments

## *Trichocera* (*Saltrichocera*) *annulata* Meigen, 1818

### Materials

a. scientificName: *Trichocera* (*Saltrichocera*) *annulata* Meigen, 1818; scientificNameID: *Trichocera* (*Saltrichocera*) *annulata* Meigen, 1818; kingdom: Animalia; phylum:

Arthropoda; class: Hexapoda; order: Diptera; family: Trichoceridae; genus: *Trichocera*; subgenus: *Saltrichocera*; specificEpithet: *annulata*; scientificNameAuthorship: Meigen, 1818; country: Spain; stateProvince: Balearic Islands; county: Mallorca; locality: Esporles, Son Tria recreational area; verbatimLocality: Spain, Mallorca, Esporles, Son Tria recreational area; verbatimLatitude: 39.663051; verbatimLongitude: 2.573698; decimalLatitude: 39.663051; decimalLongitude: 2.573698; georeferenceProtocol: label; georeferenceSources: Google Maps; samplingProtocol: sweep net; year: 2015; month: feb; day: 9; habitat: streambank and fountain in recreational area; individualCount: 1; sex: male; lifeStage: adult; identifiedBy: Andrius Petrašiūnas; dateIdentified: 2015; basisOfRecord: PreservedSpecimen

b. scientificName: *Trichocera* (*Saltrichocera*) *annulata* Meigen, 1818; scientificNameID: *Trichocera* (*Saltrichocera*) *annulata* Meigen, 1818; kingdom: Animalia; phylum: Arthropoda; class: Hexapoda; order: Diptera; family: Trichoceridae; genus: *Trichocera*; subgenus: *Saltrichocera*; specificEpithet: *annulata*; scientificNameAuthorship: Meigen, 1818; country: Spain; stateProvince: Balearic Islands; county: Mallorca; locality: Esporles, Torrent de Son Vic; verbatimLocality: Spain, Mallorca, Esporles, Torrent de Son Vic; verbatimLatitude: 39.670459; verbatimLongitude: 2.569193; decimalLatitude: 39.670459; decimalLongitude: 2.569193; georeferenceProtocol: label; georeferenceSources: Google Maps; samplingProtocol: sweep net; year: 2015; month: feb; day: 10; habitat: vegetation on stream banks; individualCount: 2; sex: male; lifeStage: adult; identifiedBy: Andrius Petrašiūnas; dateIdentified: 2015; basisOfRecord: PreservedSpecimen

c. scientificName: *Trichocera* (*Saltrichocera*) *annulata* Meigen, 1818; scientificNameID: *Trichocera* (*Saltrichocera*) *annulata* Meigen, 1818; kingdom: Animalia; phylum: Arthropoda; class: Hexapoda; order: Diptera; family: Trichoceridae; genus: *Trichocera*; subgenus: *Saltrichocera*; specificEpithet: *annulata*; scientificNameAuthorship: Meigen, 1818; country: Spain; stateProvince: Balearic Islands; county: Mallorca; locality: Esporles, Torrent de Son Vic; verbatimLocality: Spain, Mallorca, Esporles, Torrent de Son Vic; verbatimLatitude: 39.670459; verbatimLongitude: 2.569193; decimalLatitude: 39.670459; decimalLongitude: 2.569193; georeferenceProtocol: label; georeferenceSources: Google Maps; samplingProtocol: sweep net; year: 2015; month: feb; day: 10; habitat: vegetation on stream banks; individualCount: 1; sex: female; lifeStage: adult; identifiedBy: Andrius Petrašiūnas; dateIdentified: 2015; basisOfRecord: PreservedSpecimen

d. scientificName: *Trichocera* (*Saltrichocera*) *annulata* Meigen, 1818; scientificNameID: *Trichocera* (*Saltrichocera*) *annulata* Meigen, 1818; kingdom: Animalia; phylum: Arthropoda; class: Hexapoda; order: Diptera; family: Trichoceridae; genus: *Trichocera*; subgenus: *Saltrichocera*; specificEpithet: *annulata*; scientificNameAuthorship: Meigen, 1818; country: Spain; stateProvince: Balearic Islands; county: Mallorca; locality: Banyalbufera; verbatimLocality: Spain, Mallorca, Banyalbufera; verbatimLatitude: 39.690612; verbatimLongitude: 2.525107; decimalLatitude: 39.690612; decimalLongitude: 2.525107; georeferenceProtocol: label; georeferenceSources: Google Maps; samplingProtocol: sweep net; year: 2015; month: feb; day: 9; habitat: seashore cliffs; individualCount: 2; sex: male; lifeStage: adult; identifiedBy: Andrius Petrašiūnas; dateIdentified: 2015; basisOfRecord: PreservedSpecimen

e. scientificName: *Trichocera* (*Saltrichocera*) *annulata* Meigen, 1818; scientificNameID: *Trichocera* (*Saltrichocera*) *annulata* Meigen, 1818; kingdom: Animalia; phylum: Arthropoda; class: Hexapoda; order: Diptera; family: Trichoceridae; genus: *Trichocera*; subgenus: *Saltrichocera*; specificEpithet: *annulata*; scientificNameAuthorship: Meigen, 1818; country: Spain; stateProvince: Balearic Islands; county: Mallorca; locality: Deiá, Tributary to Torrent Major; verbatimLocality: Spain, Mallorca, Deiá, Tributary to Torrent Major; verbatimLatitude: 39.752634; verbatimLongitude: 2.642415; decimalLatitude:

39.752634; decimalLongitude: 2.642415; georeferenceProtocol: label; georeferenceSources: Google Maps; samplingProtocol: sweep net; year: 2015; month: feb; day: 8; habitat: rocky stream bed with bryophytes; individualCount: 1; sex: male; lifeStage: adult; identifiedBy: Andrius Petrašiūnas; dateIdentified: 2015; basisOfRecord: PreservedSpecimen

f. scientificName: *Trichocera* (*Saltrichocera*) *annulata* Meigen, 1818; scientificNameID: *Trichocera* (*Saltrichocera*) *annulata* Meigen, 1818; kingdom: Animalia; phylum: Arthropoda; class: Hexapoda; order: Diptera; family: Trichoceridae; genus: *Trichocera*; subgenus: *Saltrichocera*; specificEpithet: *annulata*; scientificNameAuthorship: Meigen, 1818; country: Spain; stateProvince: Balearic Islands; county: Mallorca; locality: Cala Figuera; verbatimLocality: Spain, Mallorca, Cala Figuera; verbatimLatitude: 39.330871; verbatimLongitude: 3.165476; decimalLatitude: 39.330871; decimalLongitude: 3.165476; georeferenceProtocol: label; georeferenceSources: Google Maps; samplingProtocol: sweep net; year: 2015; month: feb; day: 11; habitat: open forest glade in town; individualCount: 1; sex: male; lifeStage: adult; identifiedBy: Andrius Petrašiūnas; dateIdentified: 2015; basisOfRecord: PreservedSpecimen

g. scientificName: *Trichocera* (*Saltrichocera*) *annulata* Meigen, 1818; scientificNameID: *Trichocera* (*Saltrichocera*) *annulata* Meigen, 1818; kingdom: Animalia; phylum: Arthropoda; class: Hexapoda; order: Diptera; family: Trichoceridae; genus: *Trichocera*; subgenus: *Saltrichocera*; specificEpithet: *annulata*; scientificNameAuthorship: Meigen, 1818; country: Spain; stateProvince: Balearic Islands; county: Mallorca; locality: Cala Figuera; verbatimLocality: Spain, Mallorca, Cala Figuera; verbatimLatitude: 39.332245; verbatimLongitude: 3.166440; decimalLatitude: 39.332245; decimalLongitude: 3.166440; georeferenceProtocol: label; georeferenceSources: Google Maps; samplingProtocol: sweep net; year: 2015; month: feb; day: 11; habitat: vegetation in canyon near port; individualCount: 2; sex: male; lifeStage: adult; identifiedBy: Andrius Petrašiūnas; dateIdentified: 2015; basisOfRecord: PreservedSpecimen

h. scientificName: *Trichocera* (*Saltrichocera*) *annulata* Meigen, 1818; scientificNameID: *Trichocera* (*Saltrichocera*) *annulata* Meigen, 1818; kingdom: Animalia; phylum: Arthropoda; class: Hexapoda; order: Diptera; family: Trichoceridae; genus: *Trichocera*; subgenus: *Saltrichocera*; specificEpithet: *annulata*; scientificNameAuthorship: Meigen, 1818; country: Spain; stateProvince: Balearic Islands; county: Mallorca; locality: Cala Figuera; verbatimLocality: Spain, Mallorca, Cala Figuera; verbatimLatitude: 39.332245; verbatimLongitude: 3.166440; decimalLatitude: 39.332245; decimalLongitude: 3.166440; georeferenceProtocol: label; georeferenceSources: Google Maps; samplingProtocol: sweep net; year: 2015; month: feb; day: 11; habitat: vegetation in canyon near port; individualCount: 3; sex: female; lifeStage: adult; identifiedBy: Andrius Petrašiūnas; dateIdentified: 2015; basisOfRecord: PreservedSpecimen

i. scientificName: *Trichocera* (*Saltrichocera*) *annulata* Meigen, 1818; scientificNameID: *Trichocera* (*Saltrichocera*) *annulata* Meigen, 1818; kingdom: Animalia; phylum: Arthropoda; class: Hexapoda; order: Diptera; family: Trichoceridae; genus: *Trichocera*; subgenus: *Saltrichocera*; specificEpithet: *annulata*; scientificNameAuthorship: Meigen, 1818; country: Spain; stateProvince: Balearic Islands; county: Mallorca; locality: Son Serralta; verbatimLocality: Spain, Mallorca, Son Serralta; verbatimLatitude: 39.614133; verbatimLongitude: 2.553593; decimalLatitude: 39.614133; decimalLongitude: 2.553593; georeferenceProtocol: label; georeferenceSources: Google Maps; samplingProtocol: sweep net; year: 2015; month: feb; day: 12; habitat: stream bank near bridge and waterfall; individualCount: 4; sex: male; lifeStage: adult; identifiedBy: Andrius Petrašiūnas; dateIdentified: 2015; basisOfRecord: PreservedSpecimen

j. scientificName: *Trichocera* (*Saltrichocera*) *annulata* Meigen, 1818; scientificNameID: *Trichocera* (*Saltrichocera*) *annulata* Meigen, 1818; kingdom: Animalia; phylum: Arthropoda; class: Hexapoda; order: Diptera; family: Trichoceridae; genus: *Trichocera*; subgenus: *Saltrichocera*; specificEpithet: *annulata*; scientificNameAuthorship: Meigen, 1818; country: Spain; stateProvince: Balearic Islands; county: Mallorca; locality: Son Serralta; verbatimLocality: Spain, Mallorca, Son Serralta; verbatimLatitude: 39.614133; verbatimLongitude: 2.553593; decimalLatitude: 39.614133; decimalLongitude: 2.553593; georeferenceProtocol: label; georeferenceSources: Google Maps; samplingProtocol: sweep net; year: 2015; month: feb; day: 12; habitat: stream bank near bridge and waterfall; individualCount: 4; sex: female; lifeStage: adult; identifiedBy: Andrius Petrašiūnas; dateIdentified: 2015; basisOfRecord: PreservedSpecimen

### Notes

First records for Mallorca and second from the Balearic Islands (Fig. 2).

Figure 2.

*Trichocera annulata* Meigen, 1818 female from Mallorca.

*Trichocera annulata* is widespread in the Mediterranean region, with records from Algeria (Edwards 1923), Asia Minor and Ethiopia (Dahl and Alexander 1976), Malta (Ebejer 2015), Morocco (Driauach et al. 2015) and Sardinia (Petrašiūnas 2009). Along with our data from Mallorca, these records suggests that this species has an unusually high tolerance to warm temperatures within the genus *Trichocera*.

## *Trichocera* (*Saltrichocera*) *saltator* (Harris, 1776)

### Materials

a. scientificName: *Trichocera* (*Saltrichocera*) *saltator* (Harris, 1776); scientificNameID: *Trichocera* (*Saltrichocera*) *saltator* (Harris, 1776); kingdom: Animalia; phylum: Arthropoda; class: Hexapoda; order: Diptera; family: Trichoceridae; genus: *Trichocera*; subgenus: *Saltrichocera*; specificEpithet: *saltator*; scientificNameAuthorship: (Harris,

1776); country: Spain; stateProvince: Balearic Islands; county: Mallorca; locality: Esporles, Torrent de Son Vic; verbatimLocality: Spain, Mallorca, Esporles, Torrent de Son Vic; verbatimLatitude: 39.670459; verbatimLongitude: 2.569193; decimalLatitude: 39.670459; decimalLongitude: 2.569193; georeferenceProtocol: label; georeferenceSources: Google Maps; samplingProtocol: sweep net; year: 2015; month: feb; day: 10; habitat: vegetation on stream banks; individualCount: 1; sex: male; lifeStage: adult; identifiedBy: Andrius Petrašiūnas; dateIdentified: 2015; basisOfRecord: PreservedSpecimen

b. scientificName: *Trichocera* (*Saltrichocera*) *saltator* (Harris, 1776); scientificNameID: *Trichocera* (*Saltrichocera*) *saltator* (Harris, 1776); kingdom: Animalia; phylum: Arthropoda; class: Hexapoda; order: Diptera; family: Trichoceridae; genus: *Trichocera*; subgenus: *Saltrichocera*; specificEpithet: *saltator*; scientificNameAuthorship: (Harris, 1776); country: Spain; stateProvince: Balearic Islands; county: Mallorca; locality: Son Serralta; verbatimLocality: Spain, Mallorca, Son Serralta; verbatimLatitude: 39.614133; verbatimLongitude: 2.553593; decimalLatitude: 39.614133; decimalLongitude: 2.553593; georeferenceProtocol: label; georeferenceSources: Google Maps; samplingProtocol: sweep net; year: 2015; month: feb; day: 12; habitat: stream bank near bridge and waterfall; individualCount: 1; sex: male; lifeStage: adult; identifiedBy: Andrius Petrašiūnas; dateIdentified: 2015; basisOfRecord: PreservedSpecimen

## Notes

Previous records from the Iberian peninsula are only known from the Biscaya province in Northern Spain (Carles-Tolrá and Saloña 2004).

Specimens of *T. saltator* from Mallorca have around 30 setae on the ventral side of Sc vein, which is a case similarly observed in males of *T. pappi* Krzeminska, 2003 from Morocco (Driauach et al. 2015). However, in other characters the Mallorcan specimens agree with *T. saltator*, including wing venation not typical for *T. pappi* and the species-specific male gonocoxal bridge and aedeagal complex (Fig. 3 A, B, D).

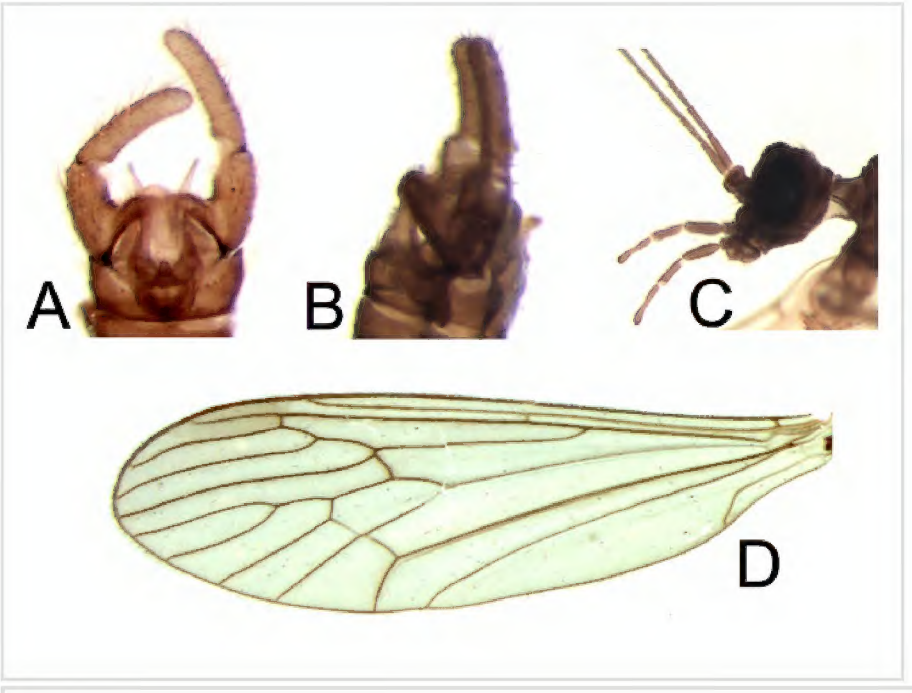


Figure 3.

*Trichocera saltator* (Harris, 1766), morphological characters. A, Male genitalia, ventral view; B, Male genitalia, lateral view; C, Head with basal antennal segments, lateral view; D, Wing

## Acknowledgements

We are grateful to Morten Stokkan, Cecilia Enriquez García and Pelayo Secades for help in arranging Gunnar M. Kvifte's stay in Mallorca; Morten Stokkan and Cecilia Enriquez García furthermore assisted in fieldwork and Morten Stokkan finally reviewed the localities.

## Author contributions

AP identified the species, curated specimens for permanent storage and produced the images. GMK collected specimens and prepared the manuscript for online submission. AP and GMK wrote the paper in tandem.

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